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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/069,680	07/17/2002	Christine Engel	10191/2217	3823
26646	7590	07/22/2004	EXAMINER	
KENYON & KENYON ONE BROADWAY NEW YORK, NY 10004			JAGAN, MIRELLYS	
			ART UNIT	PAPER NUMBER
			2859	

DATE MAILED: 07/22/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	Application No. 10/069,680	Applicant(s) ENGEL ET AL. 	
	Examiner Mirellys Jagan	Art Unit 2859	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 29 June 2004.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 14-19,21 and 24-29 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 14-19,21 and 24-29 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 17 July 2002 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Priority*

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 14-18, 21, and 24-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over British Patent 900774 to Siemens in view of U.S. Patent 4,336,215 to Yajima et al [hereinafter Yajima] and U.S. Patent 2,094,102 to Fitterer.

Siemens discloses a thermocouple comprising a first (10) and a second (11) element, wherein:

the first element and the second element are in contact with each other in an area (8) of at least one contact point,

at least in one vicinity of the contact point the first element includes a first ceramic material and the second element includes a second ceramic material that may be the same or different from the first ceramic material, wherein the material of the first element and the second

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element have an at least approximately equal thermal expansion coefficient at least in the vicinity of the contact point when the first and the second materials are the same,

a material of the first element and the second element are configured so that at the contact point one of a contact voltage occurs in accordance with a Seebeck effect and a temperature change occurs in response to an impressed external electric current in accordance with a Peltier effect,

the first and the second elements are electrically interconnected with one of a device configured to measure the contact voltage and a device configured to impress an external electric current flowing through the contact point, and

at least one of the first and the second ceramic material includes at least one temperature-resistance electrically semiconductive filler material (see figure 3, page 2, lines 81-90, page 3, lines 21-28, and page 4, lines 1-37).

Siemens does not disclose the filler material being one of  $\text{Cr}_3\text{C}_2$ , FeCr, FeCrNi; at least one of the first and the second ceramic materials including one of SiC, SiCN, SiTiCO, SiCO, SiBCN, SiBCO, BCN, SiAlCO, SiAlNCO, and SiCON compounds; and is silent as to the manner in which the first and second materials is obtained, i.e., does not disclose at least one of the first and the second ceramic materials being obtained by pyrolysis of one of a polymeric precursor material and a polymeric precursor material that includes at least one filler material, or the first ceramic material being obtained by pyrolysis of one of a first polymeric precursor material and a first polymeric precursor material that includes at least one first filler material, and the second ceramic material being obtained by pyrolysis of one of a second polymeric precursor material and a second polymeric precursor material that includes at least one second filler

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material, wherein the first and second precursor materials undergo approximately equal shrinkage in the vicinity of the contact point in response to pyrolysis.

Yajima discloses a ceramic component having a ceramic composite material containing a filler material. The ceramic material is obtained by pyrolysis of a polymeric precursor material such as SiC that includes at least one filler material, such as a carbide or a nitride (which can have approximately metallic conductivity or electrical semiconductivity). The ceramic material such as SiC is obtained by pyrolysis of a polymeric precursor material that may include at least one filler material, wherein the ceramic material is a powdered form that may be molded into any desired shape. Yajima teaches that the ceramic material has excellent mechanical strength and corrosion-resistant properties that are useful for making a thermocouple (see column 6, lines 32-56; and column 11, lines 21-25 and 46-47).

Fitterer discloses a thermoelectric apparatus comprising a ceramic thermocouple made of dissimilar materials in contact with each other to sense temperature. Fitterer teaches that carbides, such as chromium carbide ( $\text{Cr}_3\text{C}_2$ ), is a useful material in such a thermoelectric apparatus for producing a high electromotive force over a wide temperature range (see page 2, lines 28-35).

Referring to claims 14 and 29, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Siemens by replacing the ceramic material(s) used to make the thermocouple with a ceramic material(s) as taught by Yajima, in order to provide a thermocouple having mechanical strength and corrosion-resistant properties to extend the life of the thermocouple.

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Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Siemens and Yajima by using chromium carbide ( $\text{Cr}_3\text{C}_2$ ) as the carbide material, since Fitterer teaches that chromium carbide is a useful carbide material in thermocouples for providing an electromotive force to sense temperatures.

Referring to claim 28, Siemens, Yajima, and Fitterer disclose that the ceramic materials have very low thermal expansion characteristics. Therefore, approximately equal shrinkage will occur in response to pyrolysis.

Further referring to claim 29, in creating the thermocouple disclosed by Siemens, Yajima, and Fitterer as stated above, the method steps of claim 29 will naturally be followed.

4. Claims 14-19, 21, and 29 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 2,981,775 to Bachman in view of Yajima and Fitterer.

Bachman discloses a thermocouple comprising a first (31) and a second (32) element, wherein:

the first element and the second element are in contact with each other in an area of at least one contact point,

at least in one vicinity of the contact point the first element includes a first ceramic material and the second element includes a second ceramic material that is different from the first ceramic material and a solderable metal (wire),

a material of the first element and the second element are configured so that at the contact point a contact voltage occurs in accordance with a Seebeck effect,

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the first and the second elements are electrically interconnected with a device configured to measure the contact voltage, and

at least one of the first and the second ceramic materials includes at least one electrically semiconductive filler material (see figures 2 and 3, and column 3, lines 20-69).

Bachman does not disclose the filler material being one of  $\text{Cr}_3\text{C}_2$ , FeCr, and FeCrNi.

Yajima discloses a ceramic component having a ceramic composite material containing a filler material. The ceramic material is obtained by pyrolysis of a polymeric precursor material such as SiC that includes at least one filler material such as a carbide or a nitride (which can have approximately metallic conductivity or electrical semiconductivity). The ceramic material such as SiC is obtained by pyrolysis of a polymeric precursor material that may include at least one filler material, wherein the ceramic material is a powdered form that may be molded into any desired shape. Yajima teaches that the ceramic material has excellent mechanical strength and corrosion-resistant properties that are useful for making a thermocouple (see column 6, lines 32-56; and column 11, lines 21-25 and 46-47).

Fitterer discloses a thermoelectric apparatus comprising a ceramic thermocouple made of dissimilar materials in contact with each other to sense temperature. Fitterer teaches that carbides, such as chromium carbide ( $\text{Cr}_3\text{C}_2$ ), is a useful material in such a thermoelectric apparatus for producing a high electromotive force over a wide temperature range (see page 2, lines 28-35).

Referring to claims 14 and 29, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Bachman by replacing the ceramic material(s) used to make the thermocouple with a ceramic material(s) as

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taught by Yajima, in order to provide a thermocouple having mechanical strength and corrosion-resistant properties to extend the life of the thermocouple.

Furthermore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the thermocouple disclosed by Bachman and Yajima by using chromium carbide ( $\text{Cr}_3\text{C}_2$ ) as the carbide material, since Fitterer teaches that chromium carbide is a useful carbide material in thermocouples for providing an electromotive force to sense temperatures.

Further referring to claim 29, in creating the thermocouple disclosed by Bachman, Yajima, and Fitterer as stated above, the method steps of claim 29 will naturally be followed.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 14-19, 21, and 24-29 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

The following patents disclose a thermoelectric element:

U.S. Patent 4,784,313 to Godziemba-Maliszewski

U.S. Patent 5,057,161 to Kombayashi et al

U.S. Patent 5,507,879 to Gyoten et al

U.S. Patent 6,710,238 to Shingu et al

U.S. Patent 6,225,550 to Hornbostel et al

U.S. Patent 4,415,758 to Lacoste et al



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7. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mirellys Jagan whose telephone number is 571-272-2247. The examiner can normally be reached on Monday-Friday from 9AM to 4PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Diego Gutierrez can be reached on 571-272-2245. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

MJ  
July 20, 2004



**Diego Gutierrez**  
**Supervisory Patent Examiner**  
**Technology Center 2800**